
My NASA Data - Lesson Plans

Connect the Spheres: Earth Systems



Purpose

This activity was developed by [NASA's Global Precipitation Measurement \(GPM\) team](#) as an introductory experience to a series of lessons about water resources on Earth. Students will investigate Earth systems by making observations in nature and identifying systems in the natural world. Ultimately, the students will understand how the four spheres/systems on Earth (biosphere, hydrosphere, geosphere, and atmosphere) are interconnected. This lesson is based on the Elementary GLOBE Earth Systems Learning Activity titled "[We're All Connected: Earth System Interactions](#)."

Learning Objectives

- Identify processes in Earth systems
- Describe connections between Earth systems

Essential Questions

- How are the spheres within the Earth System Connected?
- How does matter cycle through the systems?
- What drives the cycling of matter through the Earth System?

Materials Required

- Pencils
- Clipboards
- Masking tape
- Copies of "Connect the Spheres" student capture sheets, including partner capture sheets
- Pictures for "beat the clock" (in the "Connect the Spheres" PowerPoint)

Please [Contact Us](#) to Receive the Answer Keys

(please note, we can only provide the answer keys for "[GPM Original](#)" lesson plans)

Procedure

Engage

Give each student a pencil, capture sheet and clipboard. Explain that they are going outside on a short nature walk (Slide 2). As they walk, students will record their observations. Some questions to think about as they walk and observe could include: What do you see? What's going on outside these days/today? What do you see happening in nature? Have you noticed any changes in nature around your home or school? The observations can seem simple, but they will all be important later on. Walk for about 5-10 minutes and ask students to record a minimum of 5 observations. If the students seem to struggle, point out a few things along the way to get their minds working: the ground is covered with leaves, a small plant is growing, a bird flew from bush to bush, etc.

Explore

Gather students back together in the classroom, or outdoor classroom. Show them the diagram of the components of Earth systems from the PowerPoint: Water, Soil, Air, Living Things, Sun (Slide 3). Ask students to write which system category each observation falls into. They can write this in the left column next to each observation on the capture sheet.

Now that they have categorized their observations, ask them to find a partner. As a pair, they will choose one of their observations to consider in more detail and describe the interactions between the systems. As you explain the task, model this process for the students (Slide 4). Hand out partner capture sheets. The pairs will write the observation and circle the picture of the system it belongs to. Then, draw arrows showing the connections between parts based on that observation. Students should write notes along the arrows to explain that connection. They should make as many connections as they can. Which group/observation will have the most connections? If they finish early, they can try another observation to see if they can get more interactions. If they seem to struggle finding many connections, show them Slide 5.

Depending on time, ask a few groups to present their observations and connections to the class. Another great technique would be to have students to post their paper around the room and do a quick gallery walk so students can see what other groups produced. Can anyone else find more connections in these examples?

Explain

Ask the students: From what they saw/heard, what overall message can they see? What are some conclusions they can make? What is this showing us? (Slide 6) Guide students to understand that all of Earth's systems are connected in some way. Each part cannot be on its own for anything to work or survive in nature.

Evaluate

Give the four scientific terms for each sphere and ask them to match them to the pictures as best as they can. Hint: use the prefixes to help!

Beat the clock! Show students a picture and ask them to write down as many connections between spheres as they can in 30 seconds.

Elaborate/Extend

- Conduct this same lesson in different seasons and compare the observations and interactions.
- Play a “Find that Observation” Game. Randomly give students an interaction pair (like sun-soil) and they must find one observation that illustrates that interaction. The observation can be from their list or from a set of cards made by the teacher.'
- [“Earth System in a Bottle” lesson from Elementary GLOBE – students create terrariums to learn about the four spheres.](#)
- [Create a play to show what they have learned about Earth's systems.](#)

Extensions

Other "Survivor: Earth" Lessons:

The following lessons have been developed to teach students about local and global water issues. They are based on NASA's Global Precipitation Measurement (GPM) Mission and an instructional module designed for Montgomery County Public Schools Outdoor Environmental Education Program (<http://www.montgomeryschoolsmd.org/curriculum/outdoored/>).

1. **Connect the Spheres: Earth Systems Interaction**
2. [Earth's Water](#)
3. [The Water Cycle](#)
4. [Water in the Hydrosphere](#)
5. [Water in the Geosphere](#)
6. [Water in the Biosphere](#)
7. [Water in the Atmosphere](#)
8. [Measuring Precipitation](#)
9. [Water Conservation](#)
10. [The Global Precipitation Measurement Mission \(GPM\)](#)

[Download the Files for all 10 Survivor Earth Lesson Plans \(.zip, 26 MB\)](#)